

Name: _____

at1117paper: Complete the Square (v308)

Example

A square's edge length is x feet. A rectangle has a height of x feet and a width of 50 feet. Their combined area, found by adding the square's area and the rectangle's area, is 1400 square feet. What is the value of x ?

Example's Solution

$$x^2 + 50x = 1400$$

To complete the square, add $\left(\frac{50}{2}\right)^2 = 625$ to both sides.

$$x^2 + 50x + 625 = 2025$$

Recognize the left side is now a perfect-square trinomial. Factor the left side.

$$(x + 25)^2 = 2025$$

Undo the squaring.

$$x + 25 = \pm\sqrt{2025}$$

$$x + 25 = \pm 45$$

Subtract 25 from both sides.

$$x = -25 \pm 45$$

In this geometric example, we are only concerned about the positive solution. So,

$$x = 20$$

Question 1

A square's edge length is x feet. A rectangle has a height of x feet and a width of 50 feet. The total area, of the square and rectangle, is 671 square feet. What is the value of x ?

$$x^2 + 50x = 671$$

$$x^2 + 50x + 625 = 1296$$

$$(x + 25)^2 = 1296$$

$$x + 25 = \pm 36$$

$$x = 11$$

Question 2

A square's edge length is x feet. A rectangle has a height of x feet and a width of 54 feet. The total area, of the square and rectangle, is 1387 square feet. What is the value of x ?

$$x^2 + 54x = 1387$$

$$x^2 + 54x + 729 = 2116$$

$$(x + 27)^2 = 2116$$

$$x + 27 = \pm 46$$

$$x = 19$$

Question 3

A square's edge length is x feet. A rectangle has a height of x feet and a width of 38 feet. The total area, of the square and rectangle, is 663 square feet. What is the value of x ?

$$x^2 + 38x = 663$$

$$x^2 + 38x + 361 = 1024$$

$$(x + 19)^2 = 1024$$

$$x + 19 = \pm 32$$

$$x = 13$$